

Abstract

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A process and apparatus for treating waste water using a sequencing batch reactor system in conjunction with a membrane filtration device for solids/liquid separation provides a highly efficient method and apparatus for the removal of organic contaminants, nutrients and suspended solids from waste water. A three-phase cycle is used, consisting of a mix fill phase, a react fill phase and a react discharge phase. In the mix fill phase the reactor environment is controlled to provide an initial anaerobic time period for achieving phosphorous release and denitrification of oxidized nitrogen present in the reactor from the prior cycle. In the react fill phase waste water continues to enter the reactor. The reactor environment is controlled to provide alternating periods of aeration and mixing and mixing only to promote completely mixed aerobic and anoxic conditions. The alternating periods of aerobic and anoxic conditions promote the oxidation of organic and nitrogenous waste products and the biological uptake of phosphorous followed by the denitrification of oxidized nitrogen. Finally, in the react discharge phase, waste water flow into the reactor ceases. The reactor environment is still controlled to provide alternating periods of aerobic and anoxic conditions. The waste water in the reactor is directed to a membrane device for solids/liquid separation. The solids/liquid mixture that does not pass through the membrane is returned to the reactor. This treatment approach eliminates the necessity to provide separate anaerobic and anoxic basins. The combination of the membrane

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